It is well known that some one-celled animals form 'filose pseudopodia,' that is, temporary, fine threads of flowing sensitive protoplasm. These serve for locomotion, taking-in of food, tactile organ, etc., *i. e.*, for relation with environment.

A recent statement that the cells and polar bodies in sea-urchin and starfish eggs put forth similar threads and so establish amongst themselves temporary living connections led the speaker to examine other animals. Filose phenomena were seen in the living eggs of an Annelid, a Gasteropod and a Lamellibranch, while preserved vertebrate material indicated their presence there also.

In the large Nemertian worm, *Cerebratulus lacteus* Verrill, the filose activities of the polar bodies are less difficult to see than those described in Echinoderms, and differ characteristically from them. Diagrams made from a series of camera drawings covering several hours' continuous observation showed that the polar bodies are very active in change of shape and in filose protrusions.

Each polar body has its special habit of action. In each there is a progressive specialization of activity. The polar bodies look not unlike Radiolarians, and when the second becomes of a spindle shape, with stars of filaments at its poles, it suggests the amphiaster stage in karyokinetic cell-division. This resemblance, so far as the star-like groups of filaments are concerned, is not superficial, if we accept* the statement that the astral rays in the starfish egg are often delicate, filose extensions of the contractile protoplasm between vesicles of an emulsion that makes up the egg; for then the internal stars and external stars are both expressions of the same contractile power and filose habit of protoplasm. Thus the filose powers of protoplasm are shown to us through various striæ, filaments, rays and threads within cells, as well as through those hitherto unsuspected, delicate, flowing, thread-like, pseudopodial extensions external to, and amongst, the cells of Metazoan masses.

* The Living Substance: As Such and as Organism. G. F. Andrews. Ginn & Co. 1897.

The Effect of Salt Solutions on Unfertilized Eggs of Arbacia. T. H. Morgan.

If unfertilized eggs of Arbacia are put into sea water, to which 1.5 per cent. sodium chloride has been added and left there from one to three hours, they will, when returned to ordinary sea water, begin to segment after about half an hour. The division is sometimes into two parts, oftener into more than two parts, and does not in any way resemble the normal cleavage. These eggs continue to divide for at least twelve hours, but do not develop into embryos.

Sections show that the female pronucleus persists in the egg in the salt solution from two to four hours. After that time the nuclear wall disappears and the chromosomes are set free in the cytoplasm, usually in the form of a dense cluster. During the time that the eggs are in the salt solution the artificial astrospheres that have been described for fertilized eggs appear. When the eggs were returned to ordinary sea water the chromosomes separate and probably divide. The rays of the artificial astrospheres that come in contact with the chromosomes thicken and become less granular. The chromosomes now begin to migrate towards the centers of the surrounding astrospheres. Later the chromosomes form resting nuclei, two or more. Around these nuclei as centers the protoplasm begins to constrict, forming the cleavage spheres seen from the surface. Half an hour later the nuclei again resolve themselves into chromosomes and a new division, etc., succeed.

The artificial astrospheres slowly fade

out and take no further part in subsequent divisions. The spindles that form after this time are very small and resemble the central spindle described by R. Hertwig for other echinoderm-eggs. The experiment shows that the additional sodium chloride added to the sea water acts as a stimulus on the nucleus, starting in it a series of changes leading to a division and separation of the chromosomes. The effect lasts through a long series of subsequent divisions. The artificial asters, as long as present, seem to act as centers towards which the chromosomes move. The rays of the astrospheres that come in contact with the chromosomes change their structure in very much the same way as do the rays that form the spindle in the ordinary karyokinetic figure.

Centrosome and Sphere in the Fertilized Egg of Unio. F. R. LILLIE.

STARTING with the typical structure of the aster in the metaphase of either maturation spindle, viz.: A small centrosome with the radiations inserted in it, and surrounded by inner and outer strata of microsomes forming inner and outer spheres, it was shown that by fusion of the stratum of microsomes bounding the inner sphere and by peripheral accumulation of its ground substance, the inner sphere is converted into a vesicle during the anaphase and telephase of both maturation divisions. This vesicle is now the central area of attachment of the radiations; and the centrosome proper is attached to the wall of the sphere by fibers, which are not part of the general system of radiations.

It was shown further that the central spindle of the second maturation division is formed within the inner sphere, and that during the prophase the centrosomes increase greatly in size and *fragment* into a number of *centrosome granules*, one of which remains as the centrosomes of the later stages (mother-star and later), while the others form in part the stratum of microsomes bounding the inner sphere, and in part become resolved into the ground substance of the inner sphere.

Combining these results with those announced before the Society in the winter of 1896 (SCIENCE, V., 114, March 5, 1897), the study of the maturation and fertilization of the egg of *Unio* was stated to offer the following evidence against the theory of the permanence and uniqueness of the centrosome:

1. A sperm amphiaster is formed, but it disappears utterly at the time of the metaphase of the first maturation spindle.

2. Entirely independently of the sperm and egg asters, there arises in the egg of *Unio* at the time of the metaphase of the second maturation spindle an accessory aster, in the center of which is a minute centrosome. This centrosome divides and a small amphiaster is formed, which entirely disappears at the beginning of the telephase.

3. After the formation of the second polar globule the egg centrosome goes the way of its kind (*i. e.*, disappears).

4. The two cleavage centrosomes arise independently of any of their predecessors, and apparently separately.

5. Fission products of the centrosomes become cytomicrosomes.

Thus the egg of *Unio* furnishes evidence, in the first place, that the centrosomes are not genetically continuous; in the second place, that a centrosome may arise *de novo* (accessory aster); and, in the third place, that products of division of the centrosome may become other formed elements of the cell.

A somewhat fuller statement is to appear in the *Zoological Bulletin*

The Fertilization of the Egg of Molgula Manhattensis. H. E. CRAMPTON, JR.